

BENCHMARKS

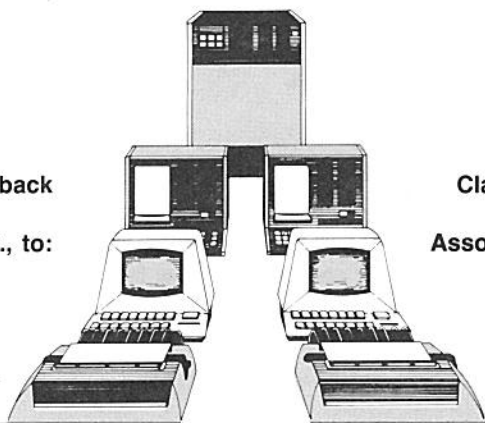
VOLUME 8 NUMBER 1 NORTH TEXAS STATE UNIVERSITY JANUARY/FEBRUARY 1987

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BENCHMARKS Reader/User feedback is encouraged.

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BENCHMARKS

JANUARY/FEBRUARY, 1987

SERVICES AVAILABLE TO USERS OF THE NTSU COMPUTING FACILITIES

The NTSU Computing Center is located in the Information Sciences Building (ISB), Room 119. Phone Numbers: Computing Center: (817) 565-2324; Help Desk: 565-4050; Graphics Lab: 565-3479
Benchmarks Questions/Contributions, Etc.—Claudia Lynch
Information & ID-Codes; Disk Space Problems—Carolyn Goodman
Statistical/Research Support—George Morrow, Scott Barber, Claudia Lynch, Rocky Ward, Panu Sittiwong
Academic ADABAS/COM-LETE; CRSP & COMPUSTAT Problems—Telka Clem
Student Programming Problems—CSCI Dept., GAB Room 542A; BCIS Dept., BA Room 152
JCL Problems; Password&Operating System Problems; Communication/Terminal Problems—Help Desk
Data Entry; Test Scoring & Analysis—Betty Grise
Administrative Applications—Coy Hoggard
Printout Retrieval—RJE Operators

DIALING UP NTSU COMPUTERS OVER THE TELEPHONE

Phone numbers for the Local Area Network (LAN) are:

300/1200 BAUD: (817) 565-3300; 3499

300 BAUD: D/FW METRO 429-6006

1200 BAUD: D/FW METRO 429-9314

The numbers that will accept either 300 or 1200 baud communications have an autobaud feature that requires you to hit the (RETURN) key repeatedly so that the receiving modem can determine the appropriate baud rate. When you have established a communications link, the # prompt will appear on your screen and you can enter one of following CALL commands to connect with the computer of your choice.

CALL 8040 connects with the NAS/8083 (does not support full screen editing)

CALL 3270 connects with the NAS/8083 through a 3270 protocol converter (supports full screen editing).

CALL DEC connects with the VAXcluster

CALL 780 connects with the Research VAX

CALL 2000 connects with the HP-2000

NTSU CABLE SYSTEM SCHEDULE

The current configuration of the NTSU cable system is as follows:

Channel 7—NT Daily. Broadcasts from the NTSU Journalism Department.

Channel 8—TAGER. Broadcasts go to and from NTSU to other links in this microwave network.

Channel 10—NTSU Computer System Status Monitor

(SSM). Displays the current status of the NAS, VAX and HP computer systems supported by the Computing Center.

Channel 12—Sammons Cable. Carries Cable News Network (CNN) unless a special program is requested.

Special broadcasts to and from classrooms can be arranged by the Media Library (565-2484).

HOURS FOR NTSU COMPUTER ACCESS AREAS: SPRING 1987*

Days	Times	Location
Sunday	2-10 p.m. Noon-Midnight 2:15-10 p.m.	ISB 110 Terminal Area Computing Center RJE GAB 550C
Saturday, Sunday	Noon-11:45 p.m. Noon-5 p.m.	College of Business Graphics Lab
Monday	7:00 a.m.-Midnight	Computing Center RJE
Tuesday-Saturday	7:00 a.m.-Open 24 hrs/day	Computing Center RJE
Monday-Thursday	7:30 a.m.-Midnight 8:15 a.m.-11:45 p.m. 8:15 a.m.-Midnight 8 a.m.-10 p.m.	ISB 110 Terminal Area College of Business GAB 550C Graphics Lab
Friday	7:30 a.m.-6 p.m. 8:15 a.m.-7:45 p.m. 8:15 a.m.-5 p.m. 8 a.m.-6 p.m.	ISB 110 Terminal Area College of Business GAB 550C Graphics Lab
Saturday	9 a.m.-6 p.m. CLOSE Midnight 12:15 p.m.-5 p.m.	ISB 110 Terminal Area Computing Center RJE GAB 550C

* Hours may vary. Check MUSIC/VAX News and/or posted schedules for exceptions.

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NEW POLICIES,
PROCEDURES,
AND OTHER
IMPORTANT
STUFF

Madron Named Executive Director of NJECN

By Bob Brookshire, Academic Computing Services Manager (AS03@NTSMUSIC)

Tom Madron, Manager of Computer Services in the NTSU Computing Center, has been named Executive Director of the New Jersey Educational Computer Network, Inc. He will be leaving NTSU at the end of February. Dr. Madron came here as Manager of Academic Computing in 1981 from Western Kentucky University, where he was Coordinator for Academic Computing and Research Services. He has been Manager of Computer Services since 1983.

As Executive Director of NJECN, Dr. Madron will be the chief executive officer of the corporation, which provides computing services to all of the New Jersey State Colleges and Universities, many private and county colleges, State agencies, and commercial corporations. NJECN provides a software product library, remote job entry, project management, data base design, systems programming, application development, disaster recovery, facilities management, and training and documentation services to its clients through a telecommunications network that is accessible statewide, nationally, and internationally.

While at NTSU, Dr. Madron has been instrumental in making a wide variety of computing services available to the University community. Perhaps his most significant achievement has been the installation of the campus-wide broadband local area network, which provides high speed data communications and two-way video transmission services to every building on campus, and with the Dallas-Fort Worth metropolitan area.

He received his Bachelor's degree from Westminster College, a Master's degree from The American University, and a Ph.D. from Tulane University, all in the field of political science. He holds the Certificate in Data Processing, and received training in systems programming from National Advanced Systems.

Dr. Madron is the author or co-author of numerous books on data processing, including *Microcomputers in Large Organizations*, *Your TI Professional Computer: Use, Applications and BASIC*, and *Using Microcomputers in Research*. His book *Local Area Networks in Large Organizations* has been reprinted in Japan by Microsoft-Japan. Two more books, *Local Area Networks: The Second Generation* and *The Micro to Mainframe Connection* will be published this year. He has also published many articles in such journals as *PC World*, *PC Tech Journal*, *BYTE*, *Kilobaud Microcomputing*, and *Personal Computing Digest*, and wrote a regular column for *Computerworld* during 1984 and '85.

He has also published widely in the social sciences. He is the author or co-author of *Political Parties in the United States: A Systems Analysis*, *Small Group Methods and the Study of Politics*, and *The Political Arena: Introductory Readings in Political Science*, as well as articles in the journals *Research in Higher Education*, *The American Journal of Sociology*, *American Behavioral Scientist*, *American Sociological Review*, and *Public Opinion Quarterly*. While at NTSU, Dr. Madron has held an appointment as Professor of Political Science.

Dr. Madron is well known as a lecturer on local area networks, microcomputers, and educational computing. He has given presentations to the National Computer Conference, the National Communications Forum, the National Electronics Conference, and Educom. He has taught classes on computing at the Summer Program of the Inter-university Consortium for Political and Social Research at the University of Michigan, and for the Professional Development Institute. Dr. Madron is an active member of the Data Processing Management Association, where he has taught review classes for CDP candidates. He is also a member of the Association for Computing Machinery, the Society for Information Management, the American Political Science Association, and many other organizations. He has acted as a consultant on data processing to local, state, and foreign governments.

During his tenure at the Computing Center, Tom Madron has earned the respect, admiration, and friendship of his staff and colleagues. He has played a pivotal role in the development of computing at NTSU, and will be missed. We wish him the best of luck in his new position.

Transitions in Academic Computing Staff

Changes in Consulting Staff

Tim King, part-time consultant for Academic Computing Services since September of 1985 has accepted a full-time position with the Texas Parks and Wildlife Department. King, A.B.D. in Biology, is fulfilling a lifelong ambition with the acceptance of this position. We wish him the best of luck. Rocky Ward, also A.B.D. in Biology, will be his replacement.

MUSIC Coordinator Hired

Philip Baczewski, a computer operator for the Computing Center since 1983, has been hired to fill the position that was vacated when Janice Green transferred to the Technical Support Group. Phil has quite a varied background and is literally "immersed in music." Not only is he the new MUSIC Coordinator, he is a doctoral candidate in the School of Music, where his area of concentration is composition. We are very glad to have Phil as a member of the Academic Computing Staff.

Computing Center Spring Short Courses

The Computing Center is offering the following short courses for the Spring semester. Please pre-register to attend. Only 20 people will be admitted per section. Courses marked with an * require knowledge of the MUSIC Context Editor. THE COMPUTING CENTER RESERVES THE RIGHT TO CANCEL COURSES WITH LESS THAN 5 PEOPLE SIGNED UP.

1. Three separate 2-hour introductory sessions on the MUSIC/SP interactive operating system, using the 3270 Protocol Converter to do FULL-SCREEN EDITING ON MUSIC/SP. To be held in Room 110 of the Science Library (ISB).

Wednesday, March 25	: 6-8 p.m.	Instructor: Scott Barber
Thursday, March 26	: 1-3 p.m.	Instructor: Panu Sittiwong
Saturday, March 28	: 9-11 a.m.	Instructor: TBA
2. A two-hour session on system Files in SAS and SPSS^X. To be held in the Graphics Lab (ISB).

Monday, March 23	: 9-11 a.m.	Instructor: Scott Barber
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3. A three-hour session on VAX Utilities & Commands. To be held in Room 110 of the Science Library (ISB).

Monday, March 23	: 6-9 p.m.	Instructor: Ron Brashear
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4. A two-hour introductory session on SAS.* To be held in Room 110 of the Science Library (ISB).

Monday, March 23	: 1-3 p.m.	Instructor: TBA
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5. A two-hour session on using MUSIC/SP Utilities.* To be held in Room 110 of the Science Library (ISB).

Saturday, March 28	: 1-3 p.m.	Instructor: Janice Green
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6. A two-hour introductory session on SPSS^X.* To be held in Room 110 of the Science Library (ISB).

Wednesday, March 25	: 9-11 a.m.	Instructor: TBA
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7. A two-hour introductory session on CMS (for use with SAS/GRAPH). To be held in Room 110 of the Science Library (ISB). LIMITED TO FACULTY AND GRADUATE STUDENTS - MUST HAVE A CMS ID-CODE.

Friday, March 27	: 1-3 p.m.	Instructor: Mansur Hasib
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8. A two-hour introductory session on using SAS/GRAPH. To be held in the Graphics Lab (ISB). [Must be familiar with CMS to attend -see #7 above].

Monday, March 30	: 1-3 p.m.	Instructor: Mansur Hasib
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Spring Break Hours for Computer Access Areas

The following exceptions to the published access times will exist during Spring Break:

Days	Times	Location
Friday, March 13	CLOSED	GAB 550C
Saturday, March 14	9 a.m.-6 p.m.	ISB 110 Terminal Area
	CLOSED	GAB 550C
	CLOSED	College of Business
	CLOSED	Graphics Lab
Sunday, March 15	CLOSED	College of Business
	CLOSED	ISB 110 Terminal Room
	CLOSED	GAB 550C
	Noon-6 p.m.	Graphics Lab
Monday-Thursday, March 16-19	CLOSED	College of Business
	Noon-8 p.m.	ISB 110 Terminal Room
	CLOSED	GAB 550C
	9 a.m.-5 p.m.	Graphics Lab
Friday, March 20	9:00 a.m.-8 p.m.	College of Business
	Noon-8 p.m.	ISB 110 Terminal Room
	CLOSED	GAB 550C
	9 a.m.-5 p.m.	Graphics Lab
Saturday, March 21	CLOSED	ISB 110 Terminal Room
	CLOSED	GAB 550C
	9 a.m.-5 p.m.	Graphics Lab

MLA on BITNET

By Steven Brehe (SKB@UMNACVX) *Reprinted with minor revisions from The ACSS Newsletter, University of Minnesota, Twin Cities, January 1987*

The Modern Language Association, a professional organization for scholars of language and literature, announced in the winter issue of its *MLA Newsletter* that it had recently acquired a BITNET address, ezt1.mla@cu20b.columbia.edu.

In fact, this is not a BITNET address, but rather an address on CCNET, a regional educational network that joins Columbia University with Carnegie-Mellon and several other schools. The sequence [.columbia.edu](http://columbia.edu) is a distinguishing mark of an address on this network. The computer, called CU20b, that Columbia University assigned to MLA for its electronic mail service is not a "true" BITNET node; it is only a node on CCNET, which has a "gateway" to BITNET.

This means that MLA members at many schools will not be able to send BITNET messages in the usual way, but will need to use a software package like GMAIL (not available at NTSU). If members do not have access to such a package, they may not be able to send electronic mail messages to MLA at all. The newsletter announcement does not prepare readers for these complications.

David Feinberg, manager of the MLA computer center, tells me (via BITNET and CCNET) that MLA is now aware of this situation and has asked Columbia to make another computer, a "true" BITNET node, available for BITNET mail, necessitating a change in MLA's address. MLA's new BITNET address is mlaod@cuvmb (standing for MLA Online Data at Columbia University Virtual Machine B). The previous address will still be active for a short time before it is closed. Members will receive more information in the next *MLA Newsletter*.

Computer Resource for Communications Professionals

The January 1987 issue of the University of Kentucky Computing Center Newsletter, *The Register*, announced the availability of a free interactive computer resource for human communication students and

professionals called COMSERVE. COMSERVE offers such services as bibliographies, announcements of professional meetings, grant opportunities, job announcements, and an electronic phone book. It is provided through the cooperation of the Center for Interactive Computer Graphics and the Department of Language, Literature, and Communication at Rensselaer Polytechnic Institute. It is also endorsed by the Committee on Computer Application of SCA and the Legislative Council of the Speech Communication Association. You may request a printed copy of the COMSERVE User's Guide by sending mail, remembering to include your mailing address, to: COMSPRT1@RPICIGCE

Talk About Personal Computing

Word has it that there is a segment of TalkRadio Weekend on KTNS 1600AM concerning personal computing and technology. It begins at noon every Saturday and the host is David Coursey, a Dallas correspondent for *MIS Week*. Coursey also frequently writes features for *Texas Computer Market* and is a regular contributor to *USA Today*.

How Accurate Are Computer Results?

By Lawrence Liddiard

Taken from December 1986 issue of The ACSS Newsletter published by Academic Computing Services and Systems of the University of Minnesota, Twin Cities (pp. 261-264)

In colloquial use the terms *precision* and *accuracy* are synonymous. With respect to computers, *precision* and *accuracy* represent quite different concepts.

Precision refers to the quality of the tool, whereas accuracy refers to the results produced by that tool. A computer may use great precision, i.e., its floating-point mantissa length / and its exponent range $e2 - |e1|$ may both be quite large, but the same computer may be condemned to produce results of mediocre accuracy. The confusion between these two terms is very clearly revealed by computer manufacturers and those computer users who believe that more precision is an automatic ticket to higher accuracy in the result.

A mediocre crew of carpenters supplied with electron microscopes to mark their cuts will still produce a rickety house.¹

Floating-point numbers for computers are composed of a signed and normalized mantissa having / base b digits and an integer exponent with range of $e1 \leq 0 \leq e2$. Since this set does not contain the number zero, zero is usually represented as a positive mantissa of all zeros with at least, exponent, $e = e1$. These definitions allow us to state that for a digital computer, a normalized floating point number x has the form $x = mb^e$ with precision /.

The Problem Areas

- Imprecise data: Physical measurements are often good only to 4 or 5 significant digits. As we were taught in grade school, starting with 4- or 5-digit numbers means that we can not expect more than that significance for the results of calculations using such numbers. Past implementations of floating-point computer arithmetic are not able to use that input significance information, so results are usually expressed to the precision of the computer, with the user having to remember that the result has at most the accuracy of the input.²

For computers, interval arithmetic was implemented to accommodate these imprecise values as interval ranges. Calculations on these input interval ranges produce result interval ranges that the interval arithmetic guarantees (one of the few guarantees given by a computer) to contain all possible results.

- Leading significant digit loss: This is the major cause of computer inaccuracy. Leading significant digits are lost when an addition or subtraction result is produced by the difference of two approximately equal values. Floating-point normalization then translates the significance loss in the leading mantissa digits into an equivalent loss in the trailing digits. For example, on a six-digit computer, adding .999876 to -.999812 gives .000064 as an intermediate result with the first four significant digits lost. Normalization results in a value of .64XXXXE - 4, where the trailing XXXX digits are unknown garbage.

This is the type of result that one expects for root values in polynomial evaluation. For $X = 0.707107$ in the polynomial $P(X) = 8119X^4 - 11482X^3 + X^2 + 5741X - 2030$, Miranker gives the correct value to be

$- (X) = -1.91527325270...E-11$, whereas a 16-digit precision computer delivers only 2 digits of accuracy, i.e.: $P(X) = -1.978150976356118981E-11$

Sometimes we can avoid this loss of significance by translating to a multiplicative rather than an additive algorithm. For example, in the quadratic formula to solve $AX^2 + BX + C$, the root of less magnitude should be found with $X2 = C/(X1 \cdot A)$ rather than $X2 = (-B + \sqrt{(B \cdot B - 4 \cdot A \cdot C)})/(2 \cdot A)$ to ensure full precision.

• **Trailing significant digit loss:** Trailing significant mantissa digits are lost due to inherent inaccuracy for each digital arithmetic operation or standard function evaluation. After millions or billions of operations, several of the trailing mantissa digits in the result differ from the result that would have been produced by an infinitely accurate digital computer. This problem is easily overcome by changing to a higher precision floating-point arithmetic, either on the same or on a different computer.

• **Exponent overflow or underflow:** All accuracy may be lost if partial or full underflow or overflow of a computer's exponent range occurs without issuing a warning. On a CYBER a partial underflow occurs for DOUBLE PRECISION when the result exponent lies between 10^{-292} and 10^{-278} . ACSS does not recommend using floating-point arithmetic with a small exponent range or precision (i.e., those with 10^{-38} to 10^{38} exponent ranges or less than 10 decimal digits of precision).

Examples of Accuracy Problems

• **Residual calculation failure:** In residual computations, the computed answer is reinserted into the original problem and a small remainder indicates an accurate solution. Miranker gives the following pair of equations with residuals R1 and R2 —

$$0.780X + 0.563Y - 0.217 = R1,$$

$$0.913X + 0.659Y - 0.254 = R2$$

— and these approximate solutions:

$$1) X = 0.999, Y = -1.001 \text{ giving } R1 = -0.001243, R2 = -0.001572$$

$$2) X = 0.341, Y = -0.087 \text{ giving } R1 = -0.000001, R2 = 0.$$

It seems that the second approximation is better due to the smaller residuals. However, the first approximation is much closer to the true solution of $X = 1$ and $Y = -1$.

• **Extended precision failure:** Suppose that we are keeping track in our computer of the 10^{55} atoms in the universe (or whatever the total is that Isaac Asimov suggests) and we throw 10 additional copper atoms into the Milky Way (one of 10^{11} galaxies)— will we ever find them again? We can imagine the necessary computer calculation of the form:

$$10 + 10^{44} + 10^{55} - 10^{44} - 10^{55} = 10$$

Most computers will lose those 10 atoms and return the answer 0 (zero), because even their extended precision arithmetic will not have the digit range to cope with this calculation.

I realize that this computer calculation to enumerate every atom of the universe may run into some time delays. If every human (10^{10}) on this planet were given a 10-gigaflop (10^{10}) processor to work on this problem and there are $3.16 \cdot 10^7$ seconds in a year, it would only take $3 \cdot 10^{27}$ years to do the task. I trust that God has a better processor.

• **Perturbation method failure:** A final example from Miranker shows that perturbation (i.e., changing the least significant digits of input values and intermediate calculations to find gross result failure) may fail for the following set of linear equations illustrates:

$$100000x + 99999y = b_1$$

$$99999x + 99998y = b_2$$

The following are computed values of x and y for end and midpoint choices of b_1 and b_2 .

$$b_1 = 199990, x = 199990,$$

$$b_2 = 199990, y = -199990,$$

$$b_1 = 200000, x = 200000,$$

$$b_2 = 200000, y = -200000,$$

$$b_1 = 200010, x = 200010,$$

$$b_2 = 200010, y = -200010,$$

This regular behavior may mislead us into concluding that the problem is stable and the computer solutions reliable. Note, however, that for $b_1 = 19999$, and $b_2 = 199997$ the solution is $x = y = 1$. The failure occurs since the small b ranges

$$199990 \leq b_1 \leq 200010$$

$$199990 \leq b_2 \leq 200010$$

have the totality of solutions for all possible choices for b_1 and b_2 of:

$$-1\,800\,000 \leq x \leq 2\,200\,000,$$

$$-2\,200\,000 \leq y \leq 1\,800\,000$$

• **Guaranteed arithmetic:** Interval arithmetic is the only computational tool that guarantees computer results. But what if the results obtained by interval arithmetic have too wide a range? How can high accuracy then be guaranteed? It is on this point that Miranker states, "High accuracy is obtained by the use of the process of residual correction." "It is the combination of these two features," he says, "namely, interval arithmetic and residual correction with the optimal scalar product, which delivers guarantees with high or even maximum accuracy." The IBM 4361 has the required basic arithmetic in hardware-supported microcode and ACRITH is a commercially available package implementing Miranker's ideas.

Conclusions

All users of computers have to keep questions of accuracy in mind when they program and/or accept the computer's answers. Maintain a healthy skepticism; and if possible, make various accuracy probes on the calculations and input data. Gross result changes after perturbation or higher precision probes are indications of ill-conditioned problems; but these two methods are no guarantee that you will find all accuracy problems. Interval arithmetic, such as INTLIB in M77 and as implemented in ACRITH, can point out all accuracy problems.³

Note, however, that using interval arithmetic requires planning and extra computer time. Jansen and Weidner pointed out some of the limitations of ACRITH both in implementation and time required. For example, on an IBM 3081, "ACRITH uses 50 seconds execution time to evaluate $0.1^{50}/(0.1^{23}0.1^{27})$, while REDUCE [a symbolic algebra system] gives the result in 0.1 second."⁴ Thus, in computing the race may not always go to the most computation, but to the better thought-out solution.

References

¹ U.W. Kulisch and W.L. Miranker, "Arithmetic of the Digital Computer," *SIAM Review* 28 (1986), pp. 1-40. Of interest also: L.A. Liddiard, "Can we trust the accuracy of computer answers?" and "Interval Arithmetic," *UCC Newsletter* (University of Minnesota) 15 (1981), pp. 17-19 and 28-29.

² If a user puts in 3.14159 for the known constant pi, this needlessly limits the accuracy of results to at most 6 significant digits. In programming, known constants should be entered to full precision to avoid inadvertent significance loss. In FORTRAN full precision can be obtained by an assignment such as $PI = 4 * ATAN(1)$.

³ "Appendix Z: Interval Arithmetic INTLIB," *M77 Reference Manual* (Minneapolis: University Computer Center, 1983), pp. 331-342.

⁴ P. Jansen and P. Weidner, "High-Accuracy Arithmetic Software - Some Tests of the ACRITH Problem Solving Routines," *ACM Transactions on Mathematical Software* 12 (1986), pp. 62-70.

BMDP Updated

The 1987 version of the BMDP programs is now available and can be accessed in the same way as the previous version, through the BIMED procedure. In addition to enhancements to the regular BMDP programs, a new product, the DATA MANAGER, or DM for short, is included. DM is designed for easy interactive use, but you can also run the program in batch mode (as must be done here at NTSU) by submitting a prepared command file. The Data Manager Manual should be available at the University Store sometime in the near future. Until that time, you may consult the copy that is owned by the Computing Center by contacting George Morrow (AS01@NTSMUSIC).

New SAS Publications Announced

The January-June 1987 SAS Institute Inc. Publications Catalog is out and is advertising some new manuals! Among those listed are:

- *SAS Guide to Macro Processing, Version 5 Edition*
- *SAS Guide to TABULATE Processing, 1987 Edition*
- *Master Index to SAS Documentation, Version 5 Edition*
- *SAS Guide for the Micro-to-Host Link, 1987 Edition*
- *SAS Applications Guide, 1987 Edition*
- *Technical Report: P-164 Additional SAS/Graph Hardware Interfaces*

The above manuals are so new that they were not priced at the time the catalogue was published. To find out their prices, you can call SAS Institute Inc. at (919) 467-8000. A majority of these will be ordered by the University Store and should be available sometime during the Spring Semester.

Another new publication from SAS Institute is *The SAS Series in Statistical Applications*. It features three SAS procedures for data analysis: ANOVA, GLM, and REG, and is priced at \$14.95. This will also be available at the University Store in the near future.

Another new feature from SAS Institute is what they call "Data Diskettes". These diskettes can be used to send examples contained therein on various SAS procedures to the mainframe computer, where they can then be run. These diskettes are intended for instructional purposes. The titles and prices are as follows:

- SAS System for Linear Models, 1986 Edition (#5627) - "call for price"
- SAS System for Regression, 1986 Edition (#5611) - \$12.95
- SAS System for Regression, 1986 Edition (#5628) - "call for price"
- SAS System for Forecasting Time Series, 1986 Edition (#5612) - \$14.95
- SAS System for Forecasting Time Series, 1986 Edition (#5629) - "call for price"

Problem With SAS PROC SYSLIN

If you specify the SUR method on a PROC SYSLIN statement when the S-Matrix is singular, you will get a very unfriendly SOC4 ABEND. SAS knows about this error, and there is no fix available for it yet. To circumvent this problem, eliminate or re-specify the involved equations.

News from SPSS Inc.**SPSS Buy Out Off**

The proposed buy out of SPSS Inc. by Pansophic did not work out. A source at SPSS stated that inter-company rumor is that SPSS Inc. is now looking to purchase other companies. Should be interesting ...

Release 2.2 "In the Mail"

Release 2.2 is supposed to arrive here "any day" now. We have been waiting two months, so far, so a little bit longer will probably not hurt. Enhancements contained in this release were summarized in the SPSS Inc. magazine *KEYWORDS*, Fall 1986, No. 40. Following are the enhancements listed in that issue.

- The INCLUDE command allows you to include a file of SPSS^X commands in an SPSS^X job by simply providing the file handle of the included file.
- Syntax and output for the MANOVA procedure have been simplified and the following statistics and diagnostics have been added: the Greenhouse-Geisser and Huyn-Feldt epsilon and the Mauchly test in repeated measures designs; collinearity diagnostics; redundancy analysis; methods for assessing effect size; observed power for univariate and multivariate significance tests; simultaneous univariate and multivariate confidence intervals for parameter estimates; optimal Scheffé contrast coefficients for each effect; QR decomposition of the matrix with observations models.
- In REPORT, the break header, including current break values, is repeated when a break group extends across more than one page. In addition, long variable labels used as column headers now wrap within the column width. This eliminates the need to respecify long labels as multiple lines within the REPORT procedure.

- **DROP DOCUMENTS** allows you to eliminate documents as you save a system file to prevent the accumulation of documents as files are matched, combined, and updated.
- **RENAME VARIABLES** can be used to change the name of a variable without changing any other attributes.
- **AUTORECODE** enhances your ability to incorporate long string data into **TABLES** and other procedures.
- The **TABLES** option includes a new **STATISTICS** command that allows you to specify a list of variables in one dimension with statistics for each of these variables in the other dimension. Other additions include side-by-side frequency tables and stacked statistics.
- **UNPORT** is a User Code that creates an **SPSS^X** command file with a **DATA LIST** command and data file equivalent that can be used as a portable file to recreate an **SPSS^X** system file on a different computer.
- **TOSPSS** now fully supports Release 5 of SAS.

SPSS/PC+ Gets Rave Reviews

The issue of **KEYWORDS** referenced above, contains an article which states that **SPSS/PC+** has received rave reviews in a comparative study of PC statistical software that was published in the September 1, 1986 issue of *InfoWorld*. According to the article:

The reviewers judged each package in seven categories and then assigned ratings on a scale of 1 - 10 points and 1 - 5 diskettes. **SPSS/PC+** received "excellent" ratings in the performance and documentation categories, and "very good" ratings for ease of use, customer support and value. Overall, **SPSS/PC+** was awarded a rating of 8.2 and four diskettes.

The *InfoWorld* article is quoted as stating:

SPSS/PC+ really takes advantage of the features, colors, and auditory prompts of the personal computer to give the user real flexibility and quality output. It's fast and accurate and everything works smoothly, including the splendid integration of Microsoft Chart. The Review facility is particularly marvelous. Overall, this is an extremely impressive package.

The **KEYWORDS** article goes on to state:

The documentation received equally glowing comments. The **SPSS/PC+** manual was described as "superb," "logically organized," and "crystal clear." In fact, the reviewers stated that "SPSS produces what is far and away the best documentation of all the statistics packages we have seen."

In terms of ease of use, **SPSS/PC+** was called a "joy" and even "fun to use."

*Problem With **ALSCAL**, **PROXIMITIES***

If you are using the **SPSS** procedure **ALSCAL** followed by the **PROXIMITIES** procedure within the same run, you will need to put an **EXECUTE** statement immediately preceding the **PROXIMITIES** command. If you fail to do this, **PROXIMITIES** will not run.

Call for Consultants

SPSS Inc. has put out a call for individuals who feel that they are competent to consult with others on the use of **SPSS** products. A list of the people who have responded so far appears in the Fall 1986 issue of **KEYWORDS**. If you would like to become a part of this list, send your name, address, phone number, and a short history of your **SPSS** experience, including knowledge of individual products to:

SPSS Inc.
Attn. Marketing Department - List
444 N. Michigan Avenue
Chicago, IL 60611

TCOM News

By Mansur Hasib, TCOM Academic Computing Coordinator (AC36@NTSMUSIC)

SPSS/PC+ Available

The last issue of *Benchmarks* announced the availability of SPSS/PC+ to qualified people at NTSU. If you are interested in acquiring a copy of the package at TCOM, you may contact me at 735-2597. You must have 10 megabytes of available hard disk space and 640K of memory on your PC to run this product. A math coprocessor would also be very advantageous.

Computer Literacy Program at TCOM

A proposal for a Computer Literacy Program at TCOM has been presented to the Computer Council, all Course Directors' groups, Curriculum Committee, Academic Chairmen, and the Student Government Association. The three key elements of the proposal are: (1) computer literacy should be a requirement for graduation; (2) the program should be self-paced; (3) a Computer Literacy Laboratory should be established to provide formal instruction on computer skills. All groups who reviewed this proposal recommended its adoption. The proposal has been submitted to the administration for further consideration.

Computer Courses

Instruction on personal computers is being provided on a regular basis to TCOM faculty, staff, and students at no cost. Since November 1986, over 150 persons have attended courses on MS-DOS/PC-DOS, WordPerfect, and Lotus 1-2-3/VP-Planner. These two-hour sessions on each program are taught at an introductory level. Beginning March 1987, some advanced courses on DOS, WordPerfect, and Lotus 1-2-3 will be offered. Sherri Roberts of Computer Services (735-2595) will register you for any of these classes.

Help On Purchasing a Computer

I have prepared a pamphlet to assist you in making computer hardware and software purchases. You may pick up a copy of this pamphlet from Sherri Roberts of Computer Services, Room 832, Med. Ed. I.

Computing Council Proceedings

A Planning Form for the Purchase of Computer Hardware and Software Acquisition was presented and discussed at the TCOM Computing Council meeting on February 6th. It was proposed that completion of this form be required prior to the purchase of hardware and software exceeding \$250.00 in value. It was proposed that after the requestor had completed the form it would be reviewed by a member of the TCOM Professional Computing Staff, who would comment on hardware and software compatibility and availability of instruction and consulting support on the item.

Token Ring Network Wiring Complete

Wiring for the installation of the IBM Token Ring Network at TCOM has been completed and about sixteen IBM compatible computers have been put on the network for testing. The file servers for the network have been put on the first floor of the new Medical Education III building. The network administration and support group will operate from this new facility as well.

Learning Resources Center

The fourth floor of Med. Ed. III houses the Learning Resources Center which includes all computer assisted instructional facilities at TCOM. The proposed PC Laboratory will greatly enhance the facilities of the Learning Resources Center.

Computer Video Graphics Sought

The Pittsburgh Community Television station (PCTV, cable channel 21) is requesting computer graphics for inclusion in a program they are producing. The graphics should be on a 3/4 inch format. The station is also interested in having a 5 second station I.D. and channel break logo for the beginning of the show. PCTV is a non-profit station, so no payment will be associated with the airing of the graphics, just exposure. They are particularly interested in creative uses of the technology in the commercial and fashion arts. If you are interested, contact: Williard Van De Bogart, Producer - Video Futures, 1815 Jane St., Pittsburgh, PA 15203, (412) 381-2081

M I C R O C O M P U T E R S

New PCWS EXEC Available

If you use the MUSIC/SP communication utility PCWS, you may be interested in knowing that there is now a new version of the NTSUCOM EXEC file. This version should allow easier access to the LAN via the local autobaud dial-up phone lines. You may obtain a copy of this new EXEC by bringing your old PCWS diskette or another formatted diskette to the Computing Center offices (ISB 119) between the hours of 8 a.m. and 5 p.m.

Cancelling Call Waiting

By Bob Brookshire, Academic Computing Manager (AS03@NTSMUSIC)

If you have the "call waiting" feature on your telephone, and you want to use a terminal or personal computer and modem with that phone, you run the risk that someone may call you while you are using your modem. The call waiting service will generate a tone on your line that will cause the modem to disconnect. You may be able to temporarily cancel your call waiting feature, however, thus avoiding frustrating interruptions in your computing. The ability to cancel call waiting is not available to everyone, though.

Tom Newell, NTSU Director of Telecommunications, has investigated this problem extensively with the local phone companies. He advises us that the call waiting feature can be cancelled for the duration of one call by dialing *70 (1170 on rotary phones). The next call you make will not be interrupted by the call waiting feature. After you hang up, the call waiting feature will be restored.

Unfortunately, the ability to cancel call waiting is not available in all areas. Southwestern Bell informs us that you can cancel call waiting if your phone is in area code 817 and your number starts with one of the following prefixes:

261	265	267	274	275	277	281	283	322	332	334	335	336	338	354	355
390	429	451	457	478	483	485	496	498	540	543	571	572	577	588	654
656	679	691	692	696	723	761	766	767	792	860	861	870	877	878	930

Southwestern Bell was unable to provide us with a similar list for the 214 area code. We suggest that if you have a phone with a 214 area code and call waiting, try the procedure described above and see if it works. If not, you don't have the capability to cancel call waiting. Representatives of the other area phone companies have informed us that they do not provide the ability to cancel call waiting.

Southwestern Bell is in the process of extending this service to additional prefixes in their service area. Even if you do not have the ability to cancel call waiting now, you may get it in the future. Contact your phone company if you have any questions about how to use the call waiting service, or if you would like to have the ability to cancel the feature temporarily.

BBS for TIs and DRs

By Scott Barber, Academic Computing Staff (AC10@NTSMUSIC)

In my searching around various BBSs, I have found one which could be interesting to many of you, and for different reasons. Its name, The Doctor's Inn, indicates the multi-fold purpose of this board.

For one, it is a BBS for the TI Professional Computer, and contains discussion areas and software in support of this machine. The SYSOP (Gene Flick) is the software librarian for the Indiana TI User's Group, and has a good collection of software for this system.

Additionally, Mr. Flick is also a medical student, and is interested in different types of medical applications for computers. The board has a discussion area devoted to these types of applications, something which could be particularly interesting to those of you at TCOM.

Different than many boards, The Doctor's Inn does not require verification after registration before you can use many of its functions, since many users are from out-of-state. As a newly registered user, you have

immediate access (for 45 minutes daily) to look through the general message area (most of which deals with TIPC issues) and upload and download shareware, and public domain or user-supported software.

However, if you want to look in and participate in the medical discussions, you need to leave a message with the SYSOP to that effect. You would then be able to get into these interchanges beginning with your next logon.

If you want your access time increased, you may either send a \$20 contribution or upload TI software. The restrictions are that it must run on the TIPC, it must not already be on the board's directory, and it must be in a "reasonable format", namely files should be sent in ARChived format. This will help to save space on the SYSOP's disk, save him the time of ARCing it himself, and save on your own LD bill!

The number for this BBS is (317) 291-6226. Try it out for yourself and see what you think. If you have any overwhelming impressions positive or negative, please let me know so that I can pass the information along...

Unix on a PC

By Jim Stinson, *Benchmarks Reader*

This is a notice to those who are interested in Unix. In the October-November issue of *Micro Cornucopia* there are two articles on a description of a co-processor board based on the 32016 chip from National Semiconductor. The articles are a description only; you would have to send away for the schematics and construction information, but it is possible to get the printed circuit board from these people.

It is estimated that it would cost about \$400 to build the board and an additional \$500 to buy a copy of Unix to run on it. The board includes a 32016 cpu, and the chip's timing control unit (clock chip), memory management unit, floating point processor, and interrupt controller. It is designed to have 2 megabytes of memory to go along with it, and should be used inside an IBM PC, AT, or compatible. They are supposed to be designing another board to be used with a Z80 CP/M system but they were not specific about which one. The machine uses a parallel port, and the designers will write software for an IBM or Z80 CP/M machine to talk to it.

The 32016 is a 32/16 bit cpu meaning it has a 32b internal architecture and a 16b external data path. The cpu and it's support chips can also be bought from Texas Instruments.

The version of Unix is AT&T UNIX System V, Release 2 from ZAI&Z Communications and is AT&T approved. This includes compilers, editors, and utilities and apparently requires a 10 megabyte hard disk.

Note that this is a brand new system designed by some of the editors of the magazine and there might be a few bugs in the hardware. Micro Cornucopia can be bought at B. Dalton's Books in the Golden Triangle Mall.

V A X E N

New Utility Menu

By Billy Barron, VAX Operator (BILLY@NTSUVAXA)

Due to user's requests, the utility menu has been changed. It is no longer full screen, but it is a lot faster and accepts parameters.

To get the utility menu just type: \$ UTILITY

Now you could also type:

\$ UTILITY DIRPAGE (This will execute the utility DIRPAGE)

or

\$ UTILITY DIRPAGE DUA1:[PUBLIC] (This will execute the command DIRPAGE sending the parameter DUA1:[PUBLIC])

BENCHMARKS

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The available utilities are:

BACKWARDS	sends messages over BITNET backwards
CAI	Computer Assisted Instruction for VMS
CHANGEMVSPW	changes user's MVS password
COMPRESS	compresses a file
DEFINEKEYS	defines your keypad
DIRPAGE	stops directory listings at the end of every page (dir/p)
DISSPLA	the DISSPLA graphics package
GRAMMAR	checks the grammar of a document
KEYS	define your keypad
LAN	utility on the Local Area Network
PARALLEL	appends two files together
PPRETTY	pretty printer program (sometimes it works/sometimes it doesn't)
PRTMENU	print menu (to use laser, remote3, etc.)
SYSTAT	shows what other user's on the VAX are doing
TALK	outdated SEND type utility
TIMEINFO	shows time & date information
UNIXTOVMS	converts UNIX files to VMS format
WHO	shows who is on the VAX
WINDOW	sets up windows

If you have a useful or interesting VAX utility, please send mail to either BILLY or OPERATOR on the VAX and your utility may be added to the UTILITY menu.

BITNET News

By Dwayne Springfield, VAX Operator (DWAYNE@NTSUVAXA)

The last issue of *Benchmarks* announced the availability of BITNET on the cluster. It is now possible to get the latest information on the condition of BITNET by entering BITNEWS at the \$ prompt. This news will contain BITNET related items such as when specific nodes will be down and new features on BITNET. BITNEWS is also available on the Videotex service (still not fully operational). To enter Videotex, type VTX at the \$ prompt. BITNEWS can be found in the VAX Operations section under the Computing Center Heading. Should you have any hints or recommendations for BITNET users, send Mail to the Operator account and we will try to put it out in BITNEWS. *See related article, below ...*

BITNET and CSNEWS

By Gene Toye, Help Desk Consultant (AC23@NTSUVAXA)

Many of you may be aware that NTSU is a member of BITNET, but until recently, only a few CMS users at NTSU could make full use of it. However, as of last December, the VAX Cluster was added to BITNET, opening up the world of network use to many of NTSU's computer users. This article discusses the use of BITNET as it is accessed from the interactive environment of the VAX, but MUSIC and CMS users may also find this information helpful.

First of all, what exactly is BITNET? Basically, it is a computer network of educational institutions. One or more computers at each institution (three here at NT) are linked over phone lines using IBM's RSCS network protocol. Through this network, users may send electronic mail to any other user on the network, send interactive messages to other users who are logged in at the same time, or make use of special facilities called file servers. The rest of this article is going to describe the many features available from one such server, CSNEWS@MAINE.

Actually, the ID for the server is simply CSNEWS. MAINE is the electronic address or "nodename" of the computer where CSNEWS is located, the University of Maine Computing Center. If you are wondering just what a file server is, it is an electronic repository of files that are of common interest to users of the network. CSNEWS has files covering a wide range of topics from the Amiga personal computer to Fantasy and Science Fiction.

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One of my personal favorites is the electronic humor magazine NUTWORKS. It is written by some students at MAINE who collect humor, much of it computer related, from users throughout the network. If you were here last year, you may remember the series "Real Programmers Don't Use Pascal" printed in *Benchmarks*. Those articles were reprints from NUTWORKS. Now that you are interested in using CSNEWS, you are probably saying "Great, but how do I access CSNEWS? I bet it takes a bunch of computer mumbo-jumbo!" Not at all! There are only two commands on the VAX that you need to know about in order to use BITNET. The first is the SEND command. It is used to send file requests to CSNEWS. Its syntax is: SEND id@nodename message

The message, in the case of CSNEWS, will be a command requesting a CSNEWS service. To begin with, there are two commands of interest: HELP and SENDME. The VAX command SEND CSNEWS@MAINE HELP will cause CSNEWS to send back a series of messages giving instructions on getting help on different CSNEWS commands. The SENDME command is used to request a file. For example, one of the first files you will want to get will be CSNEWS HELPNET. It is the users guide to CSNEWS. To request it, issue the command SEND CSNEWS@MAINE SENDME CSNEWS HELPNET. The file will then be sent out over the network. Don't expect it immediately. If the network is very busy or there are some computer problems at systems along the network, your file may not arrive until the next day. A message will be displayed at your terminal when the file arrives.

Now that the file is here, you need to receive it. The RECEIVE command (see? no mumbo-jumbo) is used to store the file in your account. Enter the command RECEIVE. The system will then show you all the files waiting for you. Enter the command RECEIVE filename to receive the file and store it. After you are finished, use the EXIT command to return to DCL.

But this is only the beginning. There are many files of interest on CSNEWS and other features to explore. Also, CSNEWS is not the only file server on BITNET. You can spend many fun and educational hours exploring the benefits available through BITNET. Happy Networking!!!

OPERATIONS

Disk Backup Schedules

Backup Schedule for OS/MVS

OS/MVS disk packs (academic and administrative) are backed up daily, Tuesday through Saturday, from 4-6:30 a.m., and Sunday from Midnight to 3 a.m. A backup of all the operating systems on the NAS CPU and their contents is done once every two weeks at some low activity period over a weekend.

MUSIC/SP Backup Hours

A message will be sent to all users signed on to MUSIC/SP approximately 10 minutes before backups are begun. It will be in the form * * MUSIC SHUT DOWN AT xxxx AM - SCHEDULED BACKUP * *. To find out the backup hours while signed on to MUSIC/SP, enter HELP HOURS. The following backup schedule is currently in effect:

Tuesday	3 a.m. (for about 3 hours)	Weekly backup
Wednesday - Saturday	4 a.m. (for about 2 hours)	Daily backup
Saturday	Midnight (for about 2 hours)	Daily backup

PHOENIX Backup Schedule

PHOENIX is backed up weekly on Sunday night. The backup begins at midnight and lasts for approximately 30 minutes.

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VAX Backup Schedule

Incremental backups of both VAX systems are performed Monday through Thursday at 4 p.m. Users do not have to log-off, but any files that are open at the time of the backup will NOT be backed up.

Full backups of both systems are done every Friday beginning at 8 a.m. These generally will take all day to complete. Again, users do not have to log-off, but any files that are open will not be backed up.

A "Stand Alone" backup of the system disk is done the third Tuesday of every month, in the afternoon, just before preventive maintenance. This procedure makes a copy of the system disk that can be used to restore its contents if the disk is completely destroyed. The system will be shut down; watch the system log-on message for specific times and dates.

NOTE: No backups are taken on the weekends. Requests for restoration of files should be made via MAIL to the username OPERATOR. Your file can only be restored if it existed before the last backup was done.

NAS/8083 Dual Processor Performance Statistics for December

CPU	SYSTEM	Scheduled Operating Hours	Planned Maint. Hours	Planned Production Hours	Unplanned Maint. Hours	Production Hours Achieved	System Uptime
ACAD	VM/SP3	744	1.70	742.30	0.15	742.15	99.9%
ACAD	MUSIC/SP	744	43.80	700.20	0.42	699.78	99.9%
ACAD	MVS/JES2	744	1.81	742.19	1.30	740.89	99.8%
ACAD	COMPLETA	744	1.98	742.02	1.99	740.03	99.7%
ADMN	MVS/JES2	744	1.27	742.73	1.47	741.26	99.8%
ADMN	COMPLETA	229	0.00	229.00	0.83	228.17	99.6%
ADMN	ADABASA	744	17.84	726.16	1.98	724.18	99.7%

System Uptime=(Production Hrs. Achieved)/(Planned Production Hrs.)

Production Hrs. Achieved = (Planned Production)-(Unplanned Maint.)

Scheduled Operating Hrs. = (Planned Maint.) + (Planned Production)

MUSIC/SP Planned Maintenance Hours include 28.12 hours for system backup and 15.40 hours for VM/SP3 system backup.

ADABASA'S Planned Maintenance Hours include 16.45 Hrs. for system backup.

The ACAD CPU achieved 100% uptime; the NAS/7360 DASD achieved 100% uptime; the NAS/7380 DASD achieved 100% uptime. The ADMN CPU achieved 100% uptime; the NAS/7360 DASD achieved 100% uptime; the NAS/7380 DASD achieved 100% uptime.

Lost productivity is calculated as the greatest amount of elapsed time that any one of the production systems was unavailable for scheduled operation. Lost productivity hours were contributed to by the following key causes:

ACAD CPU:

CPU, Tape, and Disk Subsystems (NAS)

1. Scheduled Preventative Maintenance and Diagnostics on the 7360 DASD. 1.08 HOURS
Miscellaneous
1. Undetermined causes for system restarts 1.05 HOURS
2. MVS/JES2 System TUNing/Improvements 0.94
3. ACADemic Computer System disruptions while relocating the MEMOREX Terminal
Controllers to complete Phase II of a reconfiguration in the Communications Area. 0.90

TOTAL 2.89 HOURS

BENCHMARKS

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GRAND TOTAL FOR ACAD 3.97 HOURS

ADMN CPU:

CPU, Tape, and Disk Subsystems (NAS)

1. Scheduled Preventive Maintenance and Diagnostics on the 7360 DASD. 0.97 HOURS

Miscellaneous

1. Undetermined Causes for System Restarts. 1.40 HOURS
2. MVS/JES2 System Tuning/Improvements. 0.78
3. ADMINISTRATIVE Computer System disruptions while relocating the MEMOREX 1270 Terminal Controllers to complete Phase II of a reconfiguration in the Communications Area. 0.42

TOTAL 2.60 HOURS

GRAND TOTAL FOR ADMN 3.57 HOURS

NAS/8083 Dual Processor Performance Statistics for January

CPU	SYSTEM	Scheduled Operating Hours	Planned Maint. Hours	Planned Production Hours	Unplanned Maint. Hours	Production Hours Achieved	System Uptime
ACAD	VM/SP3	744	3.28	740.72	0.47	740.25	99.9%
ACAD	MUSIC/SP	744	36.06	707.94	4.03	703.91	99.4%
ACAD	MVS/JES2	744	3.55	740.45	0.66	739.79	99.9%
ACAD	COMPLETA	744	3.72	740.28	0.73	739.55	99.9%
ADMN	MVS/JES2	744	2.17	741.83	8.46	733.37	98.9%
ADMN	COMPLETA	284	0.00	284.00	2.31	281.69	99.2%
ADMN	ADABASA	744	18.83	725.17	20.12	705.05	97.2%

System Uptime=(Production Hrs. Achieved)/(Planned Production Hrs.)

Production Hrs. Achieved = (Planned Production)-(Unplanned Maint.)

Scheduled Operating Hrs. = (Planned Maint.) + (Planned Production)

MUSIC/SP Planned Maintenance Hours include 21.71 hours for system backup and 10.75 hours for VM/SP3 system backup.

ADABASA'S Planned Maintenance Hours include 16.41 Hrs. for system backup.

The ACAD CPU achieved 100% uptime; the NAS/7360 DASD achieved 100% uptime; the NAS/7380 DASD achieved 100% uptime. The ADMN CPU achieved 98.9% uptime; the NAS/7360 DASD achieved 100% uptime; the NAS/7380 DASD achieved 100% uptime.

Lost productivity is calculated as the greatest amount of elapsed time that any one of the production systems was unavailable for scheduled operation. Lost productivity hours were contributed to by the following key causes:

ACAD CPU:

CPU, Tape, and Disk Subsystems (NAS)

1. Microcode Upgrade on 8063 Uniprocessor 3.72 HOURS

Miscellaneous

1. Undetermined causes for systems restarts. 0.73
2. MUSIC/SP System backup failures. 3.50

TOTAL 4.23 HOURS

GRAND TOTAL FOR ACAD 7.95 HOURS

BENCHMARKS**JANUARY/FEBRUARY, 1987****ADMN CPU:****CPU, Tape, and Disk Subsystems (NAS)**

1. Microcode upgrade on the 8063 Uniprocessor.	2.42 HOURS
2. I/O Processor failures.	8.58
3. Tape drive units dropped power during de-installation of the NAS 6650 Processor.	0.25
TOTAL	11.25 HOURS

Miscellaneous

1. MVS/JES2 System Tuning/Improvements.	0.66
2. COMPLETA System Tuning/Improvements.	0.63
3. COMPLETA System down to process single jobs.	0.93
4. ADABASA System shut down for file maintenance. during registration.	13.83
TOTAL	16.05 HOURS
GRAND TOTAL	27.30 HOURS

TECHNICAL SUPPORT

ACADemic (NAS) Program Hit Parade *

The following programs were used the most frequently on the NAS CPU during the month of January.

JANUARY TOP TEN PROGRAMS IN TERMS OF FREQUENCY OF RUNS

Program	Description	Number of Runs	Percent of Total
1. OTHER	Programs not Categorized	3808	18.0
2. IEBGENER	IBM Utility	3281	15.5
3. SASLPA	SAS	2839	13.4
4. SCRIPT	Waterloo/SCRIPT	2676	12.6
5. IKJEFT01	Password Change	2637	12.4
6. PTPCH	Dataset Lister	1309	6.2
7. IEWL	Linkage Editor	1078	5.8
8. PGM=*.DD	Compiled Program	1046	4.9
9. VAXPRINT	VAS/OS Print Utility	686	3.2
10. IEFBR14	IBM Null Utility	501	2.4

JANUARY TOP TEN PROGRAMS IN TERMS OF CPU SECONDS USED

Program	Description	CPU Seconds	Percent of Total
1. PGM=*.DD	Compiled Program	373197	39.0
2. SASLPA	SAS	32623	34.2
3. OTHER	Programs not Categorized	12540	13.2
4. SCRIPT	Waterloo/SCRIPT	5961	6.3
5. PTPCH	Dataset Lister	2260	2.4
6. IKJEFT01	Password Change	1773	1.9

BENCHMARKS**JANUARY/FEBRUARY, 1987**

7. IEHPROGM	IBM Utility	685	0.7
8. IEBGENER	IBM Utility	572	0.6
9. IKFCBL00	VS COBOL Compiler	526	0.6
10. IEWL	Linkage Editor	366	0.4

** ACAD is the official designation of the part of the NAS/8088 CPU that is dedicated to faculty and student use. The portion of the computer reserved for University administrative purposes is termed ADMN.*

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